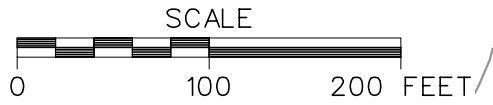


- LEGEND
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS  
(CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE

FIGURE 1-5  
SITE MAP  
BLACKTOP TRAINING AREA AND  
FENCED YARD IN BLACKTOP AREA  
PARCELS 511(7) AND 512(7)  
SITE INVESTIGATION AT  
CWM SITES

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



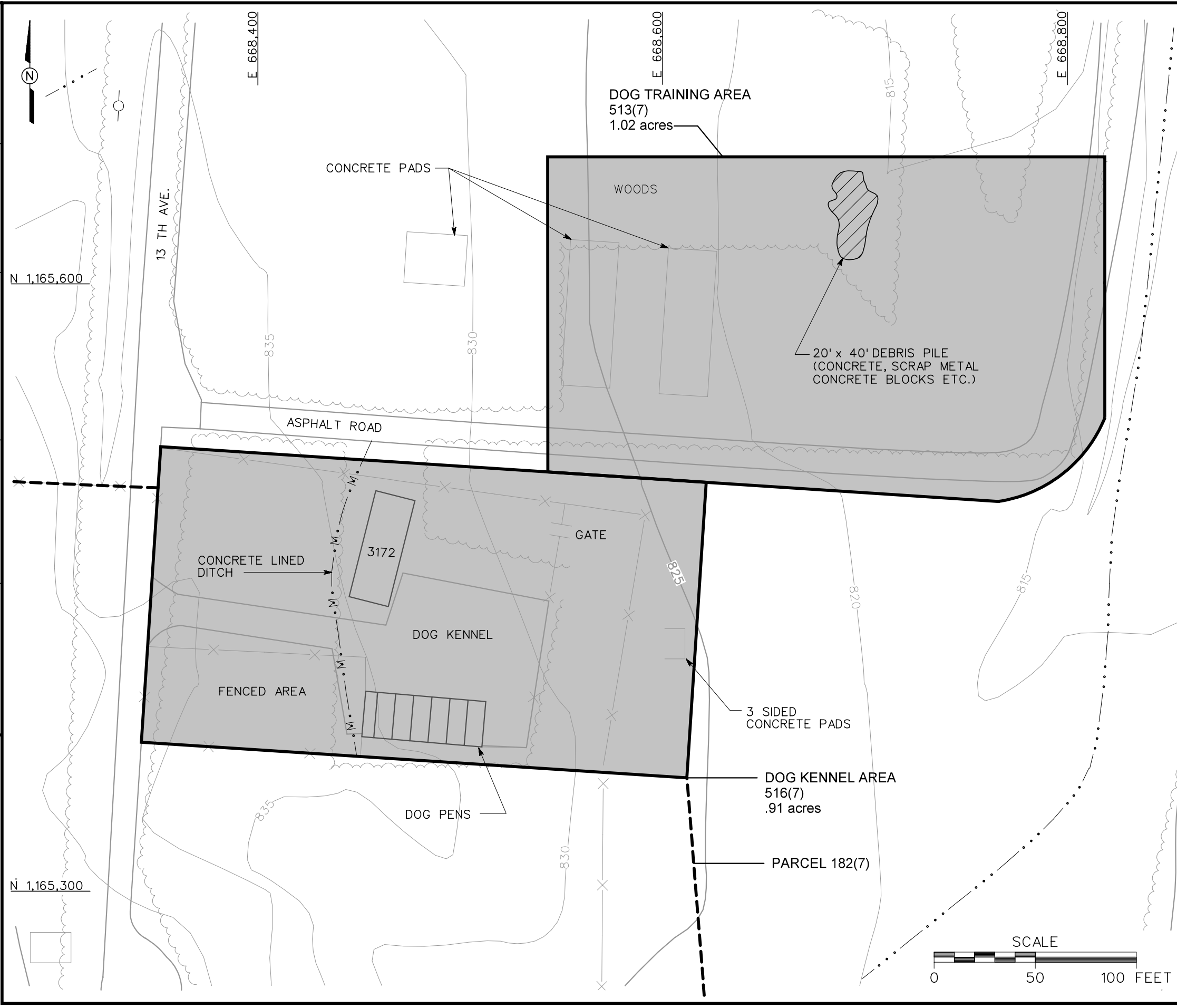
***Dog Training Area, Parcel 513(7) and Dog Kennel Area, Parcel 516(7).*** The Dog Training Area, Parcel 513(7), is located at the south end of 12th Street (Figure 1-6) and near the Dog Kennel Area, Parcel 516(7) (Figure 1-6) (Parsons, 1999). The area has been recently mowed and cleared, however, it is no longer in use (Parsons, 1999). The Dog Kennel Area has been separated from the Training Area T-5, Parcel 182(7), to be investigated with the Dog Training Area. Additionally, the Dog Kennel Area was given a separate parcel number (516[7]) (Figure 1-7). Both areas are approximately 1-acre sites.

The site was used for training dogs for the U.S. Army Military Police School and remnants of the training obstacles were still in existence in September 1998 (Parsons, 1999). A large, blistered/corroded concrete pad which was surrounded by a high fence is located within the area and may have been used to store agents or to conduct toxic agent training in “Transfer Operations,” since the Depot Area is across the road from this area (USACE, 1999a).

The historical aerial photograph analysis revealed this area contained numerous buildings in the 1940s, and the concrete pad is one of many building foundations from that era. More recent aerial photos showed several cleared areas that were likely used for dog training, but no suspect CWM training areas (Parsons, 1999). A site walk conducted by Parsons in February 1999 showed the area cleared of former dog training aids except for the concrete pad located at the site. This pad is heavily blistered/corroded, unlike other foundation pads in the vicinity (Parsons, 1999).

***Training Area T-5, Parcel 182(7).*** Training Area T-5, Parcel 182(7), is also known as the former Area T-5: Toxic Hazards Detection and Decontamination Training Area. It was located at the south end of 13th Avenue between Sunset and Howitzer Hills and covers approximately 10 and one-half acres (Figure 1-7). The Dog Kennel Area, Parcel 516(7) was separated from the Training Area T-5 to be investigated with the Dog Training Area, Parcel 513(7) (Figure 1-7). Training Area T-5 was reportedly used from 1961 to 1973. The site is posted and partially fenced (the fence is missing at the northern boundary). The operations conducted here reportedly involved detection and decontamination of CWM, including HD, nerve agent O-ethyl-S-(diisopropylaminoethyl)-methylphosphonothiolate (VX), and GB. The decontaminant chemicals STB and DS2 were probably also used here.

Training Area T-5 is wooded with mixed pine and hardwoods, including loblolly pine, yellow poplar, sassafras, dogwood, blackgum, red maple, blackjack oak, chestnut oak, some sweetgum and hickory, and Virginia pine (SAIC, 1999). The stand of trees becomes younger to the south

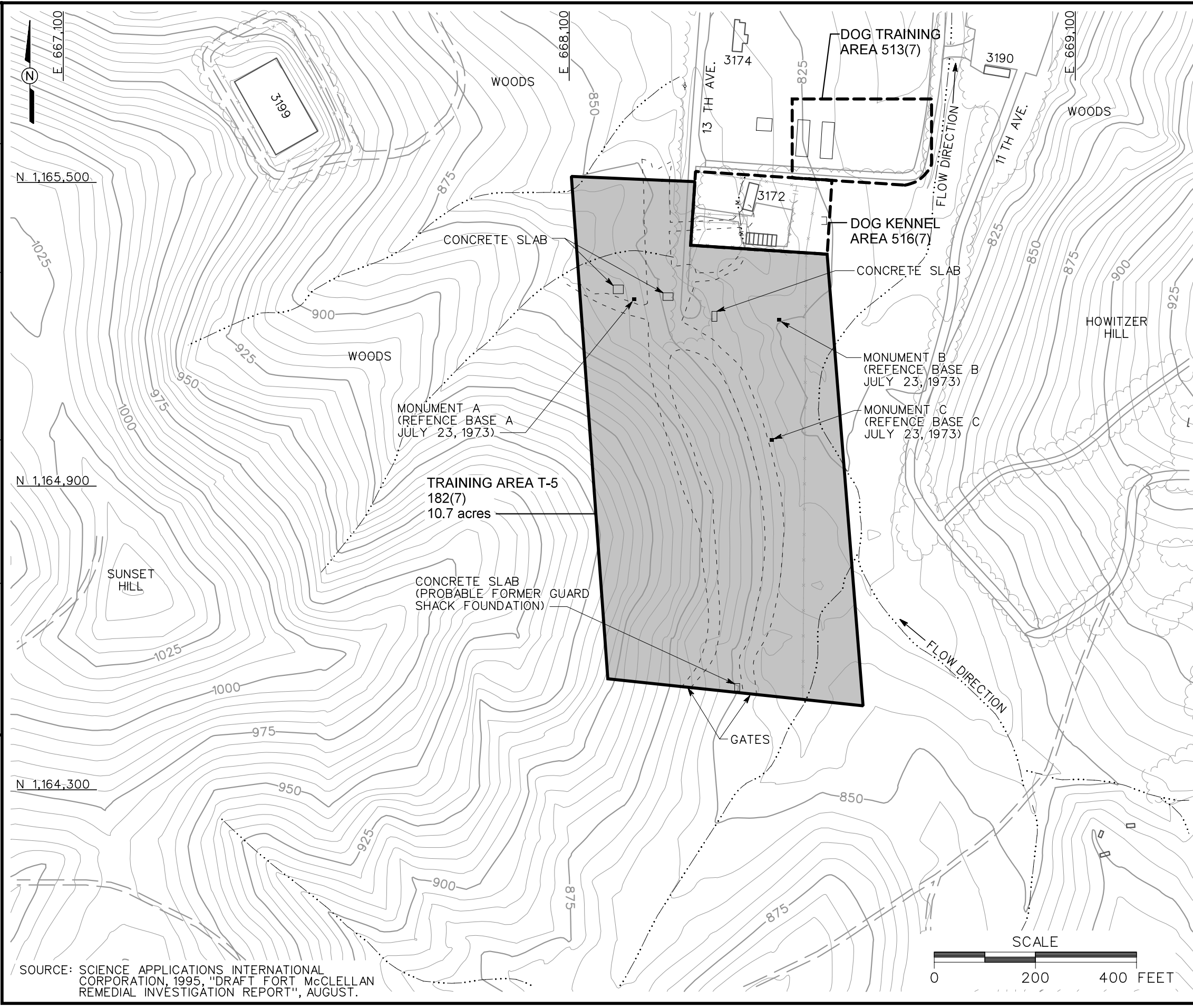


- LEGEND
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS  
(CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE  
FEATURE
- FENCE
- UTILITY POLE

FIGURE 1-6  
SITE MAP  
DOG TRAINING AREA AND  
DOG KENNEL AREA  
PARCELS 513(7) AND 516(7)  
SITE INVESTIGATION AT  
CWM SITES

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018

IT CORPORATION  
A Member of The IT Group



- LEGEND
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS  
(CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- HISTORICAL FEATURES, SAIC, 1995

FIGURE 1-7  
SITE MAP  
TRAINING AREA T-5  
PARCEL 182(7)  
SITE INVESTIGATION AT  
CWM SITES

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018

along the road at the western side of the site, where the hardwoods are mostly saplings. The area to the east of the lower road is level, with an older stand of mostly hardwoods with some pines. There are white oaks, pines to 16-inches diameter, sweetgum, hickory, and black cherry. There is a fairly open understory of dogwood, hardwood seedlings, and saplings. A small wet-weather stream runs along the eastern perimeter and off of the area. Flicker, Carolina chickadee, and nuthatch were observed on the site, as well as deer and deer trails, during the SAIC site reconnaissance on August 29 through 31, 1994 (SAIC, 1999).

Personnel interviewed during the EBS site visit report that explosive ordnance disposal (EOD) personnel formerly conducted “render-safe” exercises on munitions (typically artillery shells) in this area (ESE, 1998). EOD personnel placed the munition on the ground and poured a vial of a specific live CWA over the munition. The EOD reaction team then identified the CWA, decontaminated the munition, and packed it for transport. Exercises reportedly took place no more than 50 meters off the road. Some reports maintain that Training Area T-5 training used simulated CWM rounds only and that water was used as the decontaminant instead of STB or DS2 (ESE, 1998).

Previous reports speculated that this may be the site of a 110-gallon HD spill (Area T-4 or T-5) which reportedly occurred in 1955 (Weston, 1990). None of the personnel interviewed during the EBS site visit could recall a 110-gallon spill nor could they imagine a scenario during which a spill of this magnitude could occur; however, the HD simulant molasses residuum was delivered in 55-gallon drums. Site soils were reportedly chemically decontaminated, excavated, and disposed of at Range J (ESE, 1998).

In 1972 and 1973 the Army collected shallow soil samples from Training Area T-5 and analyzed them for HD, GB, and VX. There were not any CWAs detected in these samples and the area was permitted for surface use only (SAIC, 1993). Field screening and laboratory analysis of additional soil, sediment, and surface water samples collected at high probability locations did not detect HD, GB, VX, or their degradation products (ESE, 1998).

Investigations conducted during the remedial investigation (RI) included field screening for CWM and CWM breakdown products, and soil sampling, surface water, and sediment sampling (SAIC, 1995). Ordnance was observed in Training Area T-5 and appeared to be the result of recent U.S. Army training using dummy rounds (ESE, 1998).

**Former Detection and Identification Area, Parcel 180(7).** The Former Detection and Identification Area, Parcel 180(7), was located southwest of Building 3185 and covers an area of approximately one-half acre (Figure 1-8). This area was used from some time in the 1950s until 1972 for training in the detection and identification of CWM. The CWM used at this location may include simulants, HD, GB, carbonyl chloride, cyanogen chloride, dichloroformoxime, hydrogen cyanide, STB, and DS2 (ESE, 1998). Portions of this area are currently fenced and posted (Weston, 1990).

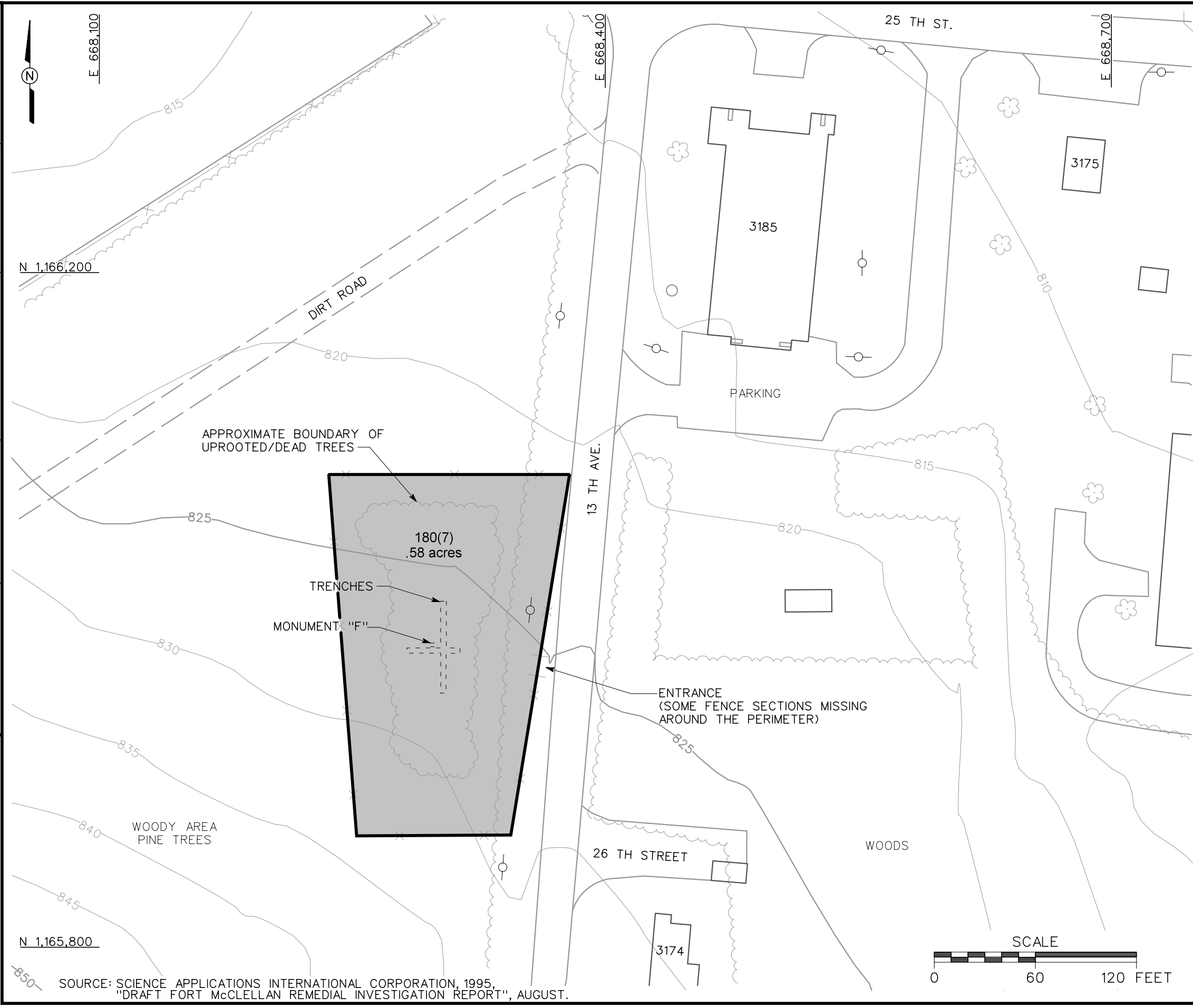
The site contains a young stand of mixed pine and hardwoods, (maximum of 6-inch diameter pine) with black cherry, sweetgum, and red cedar trees (SAIC, 1999). There is an understory with sumac, *Vitis spp.*, honeysuckle, and Virginia creeper (SAIC, 1999). There is a well-developed litter layer of mostly pine needles. Snow damage to many small pines in the area was evident (trees were bent, broken, or uprooted) from a snowstorm in the spring of 1993. Herbaceous cover included passionflower and an unidentified tall feathery asparagus-like plant. Some herbaceous cover (about 25 percent) in areas of the site was disturbed by sampling and drilling activities. The site is surrounded on three sides by more mature pine stands. The surrounding stand of trees has loblolly pines to about 18 inches diameter, with some dogwood and small privet. Carolina chickadees were observed on the site. There was evidence of striped skunks (SAIC, 1999). Numerous deer tracks were observed at the site.

Weston (1990) reported that several types of live CWM may have been used here and that STB and DS2 were used on surface soils, presumably during final decontamination before the USACMLS transferred from FTMC to the Aberdeen Proving Ground, Edgewood Area in 1973. Weston (1990) also reported that training aids and “a building from Area T-4 were burned twice and buried” at this site (Weston, 1990).

Personnel interviewed during the EBS site visit who participated directly in operations at this site report that no training materials (CWM) contacted the ground and that no disposal activities occurred at this location to the best of their knowledge (ESE, 1998). Accounts of personnel interviewed during the EBS site visit differ regarding the CWM used. Some sources indicate that only simulants were used at this location, while others recall that dilute CWM-containing mixtures were used to train troops. Vials of simulated CWM (dilute live CWM according to some sources), were reportedly placed into containers atop poles in the training area. The poles were approximately 3 feet tall, approximately twenty-four in number, and are visible on 1964 aerial photos. SCAITS kits (chemical identification kits) were used at the Former Detection and

DBILLING  
c:\cadd\design\796887\es.011

10/06/00 10:52:20	STARTING DATE: 12/15/99 DRAWN BY: D. BILLINGSLEY	DATE LAST REV.: DRAWN BY:	DRAFT. CHECK. BY: ENGR. CHECK. BY: J. RAGSDALE	INITIATOR: J. RAGSDALE PROJ. MGR.: J. YACOB	DWG. NO.: ... \796887\es.011 PROJ. NO.: 796887
----------------------	---	------------------------------	---	--	---



- LEGEND**
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - BUILDING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - UTILITY POLE
  - HISTORICAL FEATURES, SAIC, 1995

**FIGURE 1-8**  
**SITE MAP**  
**FORMER DETECTION AND**  
**IDENTIFICATION AREA**  
**PARCEL 180(7)**  
**SITE INVESTIGATION AT**  
**CWM SITES**

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, 1995,  
"DRAFT FORT McCLELLAN REMEDIAL INVESTIGATION REPORT", AUGUST.

Identification Area. Vials in old SCAITS kits of the 1950s reportedly contained a very low concentration of CWM. There were not any spills reported at this site (ESE, 1998). In 1973, the surface was declared clean by U.S. Army Toxic and Hazardous Materials Agency and FTMC USACMLS and the area was authorized for surface use only (ESE, 1998).

FTMC personnel report that other training activities known as “G-shoots” were conducted at a VX demonstration area that was located in the northern portion of the fenced Former Detection and Identification Area (ESE, 1998). The CWA GB was used in this training. The operation involved placing one drop of GB on the nose of a goat, observing symptoms, then reviving the animal with an intramuscular atropine injection. Reportedly, there was very little chance of CWA release during this exercise due to the small quantities on hand and controlled usage.

The Former Detection and Identification Area was investigated by geophysical surveys, trenching, and soil sampling during the RI (SAIC, 1995). Numerous geophysical anomalies were detected, some of which may indicate buried metallic or nonmetallic material. Four test pits were excavated in 1993 and four soil borings were drilled and sampled in 1994. Materials excavated from the test pits included construction debris (concrete and rebar). One soil sample was collected from each of the test pits. Samples were screened in the field for the presence of HD and GB, and then sent to the laboratory for determination of the presence of HD and GB breakdown products. Neither HD, GB, nor their breakdown products were detected in any of the soil samples or in samples collected from this area previously (SAIC, 1993; SAIC, 1995).

***Old Burn Pit, Parcel 514(7).*** The Old Burn Pit, Parcel 514(7) is located in the woods behind the Motor Pool 3100 on 13th Avenue and covers an area of 0.15 acres (Figure 1-9). This site was identified for consideration during the field visit to collect information for the archive search report (USACE, 1999a). Although nothing is known about the site and this area is not specifically listed as hosting chemical training, it appeared to be a burn pit and therefore was selected for further sampling to ensure that CWM was not present.

The aerial photograph analysis does show a well defined cleared area in the 1961 aerial photograph that coincides with the location of the burn pit (Parsons, 1999). A site visit conducted in February 1999 by Parsons revealed the area behind the Motor Pool to be wooded, but the remains of the pit were still visible. The pit is covered over with a wire mesh and contains some remnant metallic objects within it (Parsons, 1999).

DBILLING

c:\cadd\design\796887es.012

10/06/00  
10:58:06

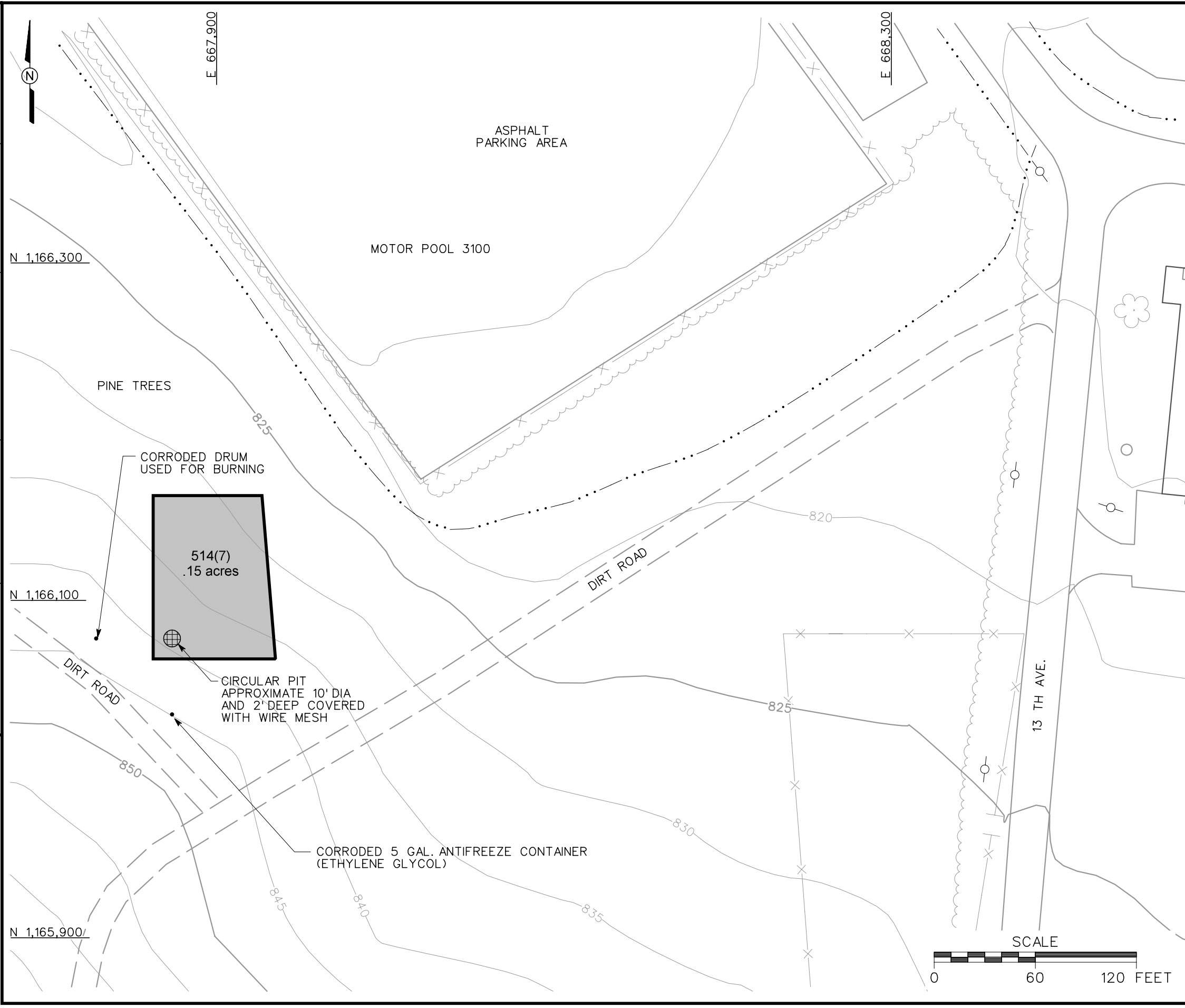
STARTING DATE: 12/15/99  
DRAWN BY: D. BILLINGSLEY

DATE LAST REV.:  
DRAWN BY:

DRAFT, CHCK, BY:  
ENGR, CHCK, BY: J. RAGSDALE

INITIATOR: J. RAGSDALE  
PROJ. MGR.: J. YACOUB

DWG. NO.: ... \796887es.012  
PROJ. NO.: 796887



- LEGEND
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS  
(CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE

FIGURE 1-9  
SITE MAP  
OLD BURN PIT  
PARCEL 514(7)  
SITE INVESTIGATION AT  
CWM SITES

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018

***Chemical, Biological, and Radiological Proficiency Area, Parcel 517(7).*** The Chemical, Biological, and Radiological Proficiency Area comprises just over 4 and one-half acres within the Main Post at FTMC (Oak Ridge National Laboratory, 1999). This area appears on the 1969 Orientation Map of the Chemical School Student Guide (USACE, 1999a). The site is located at the northwest corner of 23rd Street and 11th Avenue (Figure 1-10). It is not known how the site was used by the Chemical School. The use of toxic agents at this site is also unknown. Buildings 3136 (adjacent to the parcel) and 3137 have since been erected at this site (1976 and 1988, respectively).

***Old Toxic Training Area, Parcel 188(7).*** The Old Toxic Training Area, Parcel 188(7) is on the Main Post, located across the road south and east of Building 3183 (Figure 1-11). The site reportedly occupied an area of up to 10,000 square feet. The parcel size that is shown in the EBS is almost 1 acre (ESE, 1998). The Old Toxic Training Area is reported to be located in a ditch or shallow depression behind Building 3183 (on the south side), east of 13th Avenue. Parsons reported the total area to be about 484 square feet (Parsons, 1999). The site was reportedly used from the 1950s through at least the 1960s; although exact dates of operation could not be determined. The current status of the site includes unrestricted access, fenced/posted, and paved areas.

The site was reportedly formerly used for training military personnel in the detection and identification of HD and possibly other CWM and the use of decontamination agents, probably including STB, DANC, and/or DS2. Some personnel report training here using dilute HD, choking agents, blood agents (ESE, 1998), and nerve agent (VX). Training reportedly used minute quantities of CWM (ESE, 1998).

SAIC (1993) reported that the site consisted of a ditch with an area of about 480 square feet used in training for detection of HD (ESE, 1998). No spills were reported; and decontamination was reportedly conducted after each exercise. Some personnel interviewed during the EBS site visit recalled live CWM training in a ditch in this area; others do not. One individual interviewed during the EBS site visit believed that the Old Toxic Training Area was actually located east of Building 3183, not to the south as reported by others (ESE, 1998). Other personnel report no knowledge of training activities at this location and reportedly walked across this location regularly during the 1960s and 1970s (ESE, 1998).

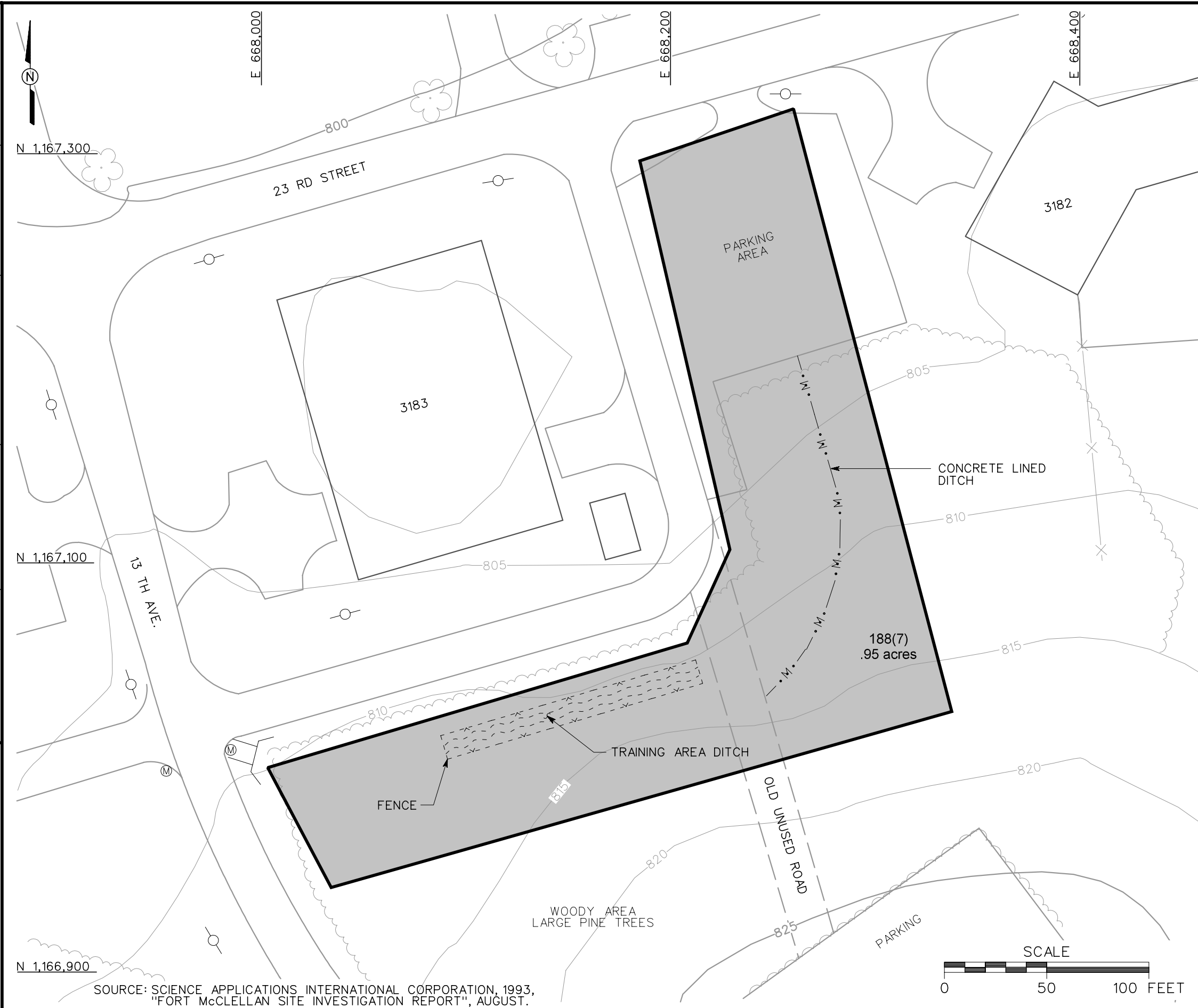
Previous investigations report that CWM appear to have been placed on the ground surface and likely decontaminated with STB and DS2 (Weston, 1990). Training exercises conducted at this



- LEGEND**
- UNIMPROVED ROADS AND PARKING
  - PAVED ROADS AND PARKING
  - BUILDING
  - TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
  - TREES / TREELINE
  - PARCEL BOUNDARY
  - SURFACE DRAINAGE / CREEK
  - MANMADE SURFACE DRAINAGE FEATURE
  - FENCE
  - UTILITY POLE
  - UNDERGROUND CULVERT WITH HEADWALL

**FIGURE 1-10**  
**SITE MAP**  
**CBR PROFICIENCY AREA**  
**PARCEL 517(7)**  
**SITE INVESTIGATION AT**  
**CWM SITES**

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



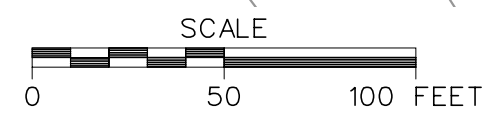
- LEGEND
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS  
(CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- UTILITY POLE
- MANHOLE
- UNDERGROUND CULVERT WITH  
HEADWALL
- MANMADE SURFACE DRAINAGE  
FEATURE
- HISTORICAL FEATURES, SAIC, 1993

FIGURE 1-11  
SITE MAP  
OLD TOXIC TRAINING AREA  
PARCEL 188(7)  
SITE INVESTIGATION AT  
CWM SITES

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



SOURCE: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, 1993,  
"FORT McCLELLAN SITE INVESTIGATION REPORT", AUGUST.



area were reportedly similar to those at the Former Detection and Identification Area, and this area was used only when the Former Detection and Identification Area was not available.

A SI completed in 1993 included four soil samples collected from two locations at depths of between 1 foot and 5 feet (SAIC, 1993). The two sampling locations were along the centerline of the ditch. The samples were screened for HD by U.S. Army Technical Escort Unit (USATEU) using the MINICAMS and nothing was detected above background readings. Laboratory analysis for degradation products was also negative (SAIC, 1993).

Historical aerial photograph analysis does not show any significant indications of CWM activity at this site over the years (Parsons, 1999). A bare area that could be a ditch is visible east of the building in the 1954 aerial photograph. There are not any other anomalies that appear to be ditches on the east side of the building (Parsons, 1999).

A site visit in February 1999 by Parsons determined that the area east of Building 3183 is paved as a parking lot/driveway. Historical reports indicate that live agent was not placed on the ground from 1961 to 1964. It appears most likely, that if live agent was put on the ground, it was prior to 1961 (Parsons, 1999).

**Soils.** Soils at the CWM sites fall primarily in the followings soil series:

- Anniston and Allen series
- Montevallo series
- Jefferson series.

The soils at five of the CWM sites fall into Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded (AcB2) (U.S. Department of Agriculture [USDA], 1961). These sites are the following:

- Dog Training Area (Parcel 513)
- Dog Kennel Area (Parcel 516)
- Training Area T-5 (Parcel 182)
- Former Detection and Identification Area (Parcel 180)
- Old Toxic Training Area (Parcel 188).

The Anniston and Allen series of soils consist of strongly acid, deep, well-drained soils that have developed in old local aluvium. The parent material washed from the adjacent higher lying Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone,

shale, and quartzite. The surface sandstone and quartzite gravel and cobbles, as much as 8 inches in diameter, are on the surface and throughout the soil. The depth to bedrock at these sites ranges from 2 feet to greater than 10 feet. The depth to the water table is likely greater than 20 feet. The typical soil description is 2 to 10 feet of well-drained stony loam to clay loam over stratified local alluvium, limestone or shale bedrock. Shallow groundwater direction at the site is probably controlled by topography.

This mapping unit (AtB2) consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. The alluvium ranges in thickness from 2 to more than 8 feet. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low.

Soils at the Agent ID Area (Parcel 509) fall into the Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2) (USDA, 1961). The general Anniston and Allen series is described above.

This mapping unit (AcC2) consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. The alluvium ranges in thickness from 2 to more than 8 feet. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low. Some severely eroded areas may be common on the surface for the AcC2 soil type, as well as a few shallow gullies.

Soils at the CBR Proficiency Area (Parcel 517) fall into the Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded (AcD2) (USDA, 1961). The general Anniston and Allen series is described above.

This mapping unit (AcD2) consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. The alluvium ranges in thickness from 2 to more

than 8 feet. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low.

Soils at the Old Burn Pit (Parcel 514) fall into the Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded (AcE2) (USDA, 1961). The general Anniston and Allen series is described above.

This mapping unit (AcE2) consists of surface soil that is very dark brown to very dark grayish-brown gravelly loam, 6 to 8 inches thick. In many places, severely eroded patches and shallow gullies are common. The plow layer is reddish-brown to dark reddish-brown gravelly clay loam.

Soils at Training Area T-6 (Naylor Field ) (Parcel 183) fall into the mapping unit of Montevallo shaly silty clay loam, 10 to 40 percent slopes, severely eroded (MtD3) (USDA, 1961). The Montevallo series consists of shallow, well-drained strongly acid soils that have developed in the residuum of interbedded shale and fine-grained sandstone or limestone. Where these soils are not eroded, the surface soil is very dark grayish-brown to very dark brown shaly silt loam. Fragments of shale, less than two inches in size, are commonly in the soil. The depth to bedrock typically ranges from 1 foot to 1.5 feet below ground surface (bgs). The depth to the water table for this series is usually greater than 20 feet.

This mapping unit (MtD3) consists of soils that have developed in residuum on upland. Erosion has removed all or nearly all of the original surface soil. The color of the soil 2 to 4 inch surface bgs is a yellowish-brown shaly silty clay loam. The sub-soil is a yellowish-brown shaly silt loam. Fragments of shale, less than two inches square, are commonly in the soil.

Soils at the Blacktop Training Area and Fenced Yard in the Blacktop Area (Parcels 511 and 512, respectively) fall into the Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded (JeB2) (USDA, 1961). The soils at this site are of the Jefferson series and typically consist of 1.5 feet to 4 feet of well-drained, strongly acid soils that occur in small areas on fans and on foot slopes in the Choccolocco, Colvin and Coldwater Mountains (USDA, 1961). These soils have developed from old local alluviums that washed or sloughed from ridges of sandstone, shale, and Weisner quartzite. Shallow groundwater direction at the site is probably controlled by topography and is probably to the southeast. The depth to bedrock typically ranges from 2 feet to greater than 4 feet. The depth to the water table for this series is usually greater than 20 feet.

This mapping unit (JeB2) is friable soil developed from old local alluvium on foot slopes and fans along ridges and mountains. The surface soil is dark-grayish-brown fine sandy loam, and the subsoil is yellowish-brown, light fine sandy clay. Fragments as large as 8 inches in diameter are on the surface and throughout the soil.

#### **1.4 Regional Geology**

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold and thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold and thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appear to dominate the unit and consist primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consist of sandy and micaceous shale and silty, micaceous mudstone, which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation east and southwest of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

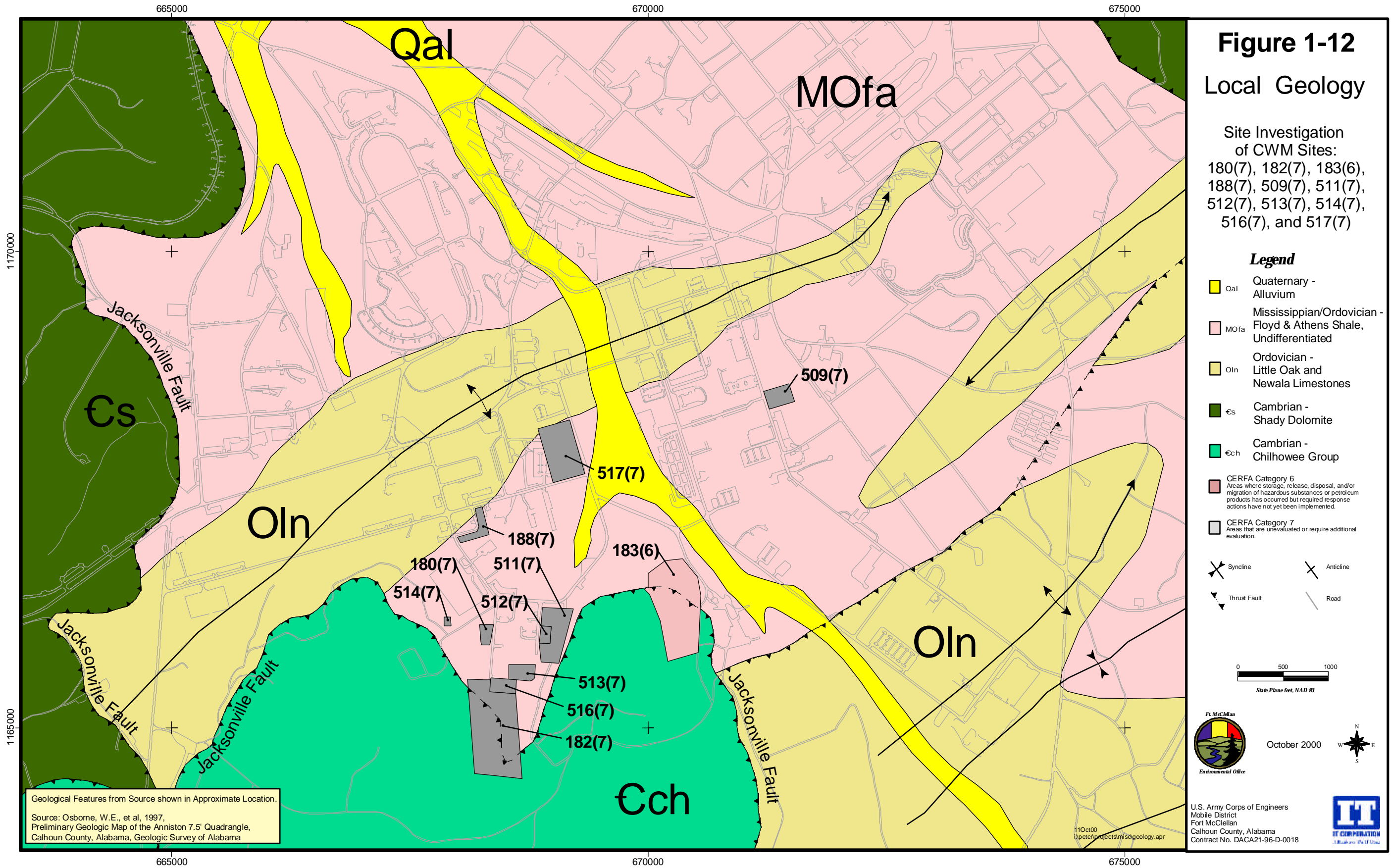
The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded “window” in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites, and limestones, and are mapped as one undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian Age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for



approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded “window” or “fenster” in the overlying thrust sheet. Bedrock units within the window display complex folding. The folds are overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east and southeast by the Shady Dolomite, and southwest by the Chilhowee Group (Osborne et al., 1997).

### **1.5 Local Geology**

The 11 CWM sites are located on the southern boundary of the FTMC Geologic Window. Figure 1-12 is a geological map of the area of the 11 CWM sites. The bedrock within the window consists of the undifferentiated Ordovician Newala and Little Oak Limestones and the undifferentiated Ordovician/Mississippian Athens and Floyd Shales (Osborne et al., 1997). The boundary of the window is defined by the Jacksonville Fault, which extends in an irregular line from west to east through the area. Regionally, the Jacksonville Fault strikes northeast to southwest. The fault strikes northwest to southeast through the central portion of Parcel 182(7) and roughly west to east through the central portion of Parcel 183(6). The bedrock unit to the south of the Jacksonville Fault, in the area of the CWM sites, is mapped as Cambrian undifferentiated Chilhowee Group (Osborne et al., 1997).

***Agent ID Area (Parcel 509[7]), Blacktop Training Area (Parcel 511[7]), Fenced Yard in Blacktop Area (Parcel 512[7]), Dog Training Area (Parcel 513[7]), Dog Kennel Area (Parcel 516[7]), Old Burn Pit (Parcel 514[7]), and Former Detection and Identification Area (Parcel 180[7]).*** Bedrock in the area of Parcels 509(7), 511(7), 512(7), 513(7), 516(7), 514(7), and 180(7) has been mapped as the undifferentiated Ordovician/Mississippian Athens and Floyd Shales. Data collected during SI activities from parcels in the vicinity of these CWM sites indicate that the shale is gray to black and severely to slightly weathered. Split-spoon samples collected from the severely weathered shale are characterized as very friable, brittle, and thin bedded with a steep to near vertical dip. Hollow-stem auger drilling is generally easy through the severely to moderately weathered shale and hard in the lightly weathered and fractured shale.

***Old Toxic Training Area (Parcel 188[7]) and CBR Proficiency Area (Parcel 517[7]).***

The undifferentiated Ordovician/Mississippian Athens and Floyd Shales and undifferentiated

Ordovician Newala and Little Oak Limestones underlie Parcels 188(7) and 517(7). The shale units underlie the southern two-thirds of Parcel 188(7) and all but the northwest corner of Parcel 517(7). Data collected during previous SI activities at other parcels in the vicinity of these CWM sites indicate that the shale is gray to black and severely to slightly weathered.

The limestone units are mapped by the Geologic Survey of Alabama (GSA) as extending across the northern end of Parcel 188(7) and the northwestern corner of Parcel 517(7). Sandy and gravelly clay soils with chert (typical of limestone derived soils) were encountered at nearby parcels. Shallow auger refusal on chert and limestone has occurred nearby.

***Training Area T-5 (Parcel 182[7]) and Training Area T-6 (Parcel 183[6]).*** The Jacksonville Fault extends through Parcels 182(7) and 183(6). The bedrock below the eastern half of Parcel 182(7) and all but the southwestern corner of Parcel 183(6) consists of the Athens and Floyd Shale. Data collected during SI activities from parcels in the vicinity of these 11 CWM sites indicate that the shale is gray to black and severely to slightly weathered.

The undifferentiated Chilhowee Group underlies the western half of Parcel 182(7) and the southwestern corner of Parcel 183(6). Data collected during SI activities from parcels underlain by the Chilhowee Group indicate the unit is characterized as white, fine to medium grained sand, sandstone and quartzite. Osborne and Szabo classified this unit as the Weisner Formation of the Chilhowee Group (Osborne and Szabo, 1984).

## ***1.6 Regional Hydrogeology***

The hydrogeology of Calhoun County has been investigated by the GSA (Moser and DeJarnette, 1992) and the U.S. Geological Survey in cooperation with the GSA (Warman and Causey, 1962) and Alabama Department of Environmental Management (ADEM) (Planert and Pritchett, 1989). Groundwater in the vicinity of FTMC occurs in residuum derived from bedrock decomposition; within fractured bedrock; along fault zones; and from the development of karst frameworks. Groundwater flow may be estimated to be toward major surface water features. However, because of the impacts of differential weathering, variable fracturing, and the potential for conduit flow development, the use of surface topography as an indicator for groundwater flow direction must be used with caution in the area. Areas with well-developed residuum horizons may subtly reflect the surface topography, but the groundwater flow direction also may exhibit the influence of pre-existing structural fabrics or the presence of perched water horizons on unweathered ledges or impermeable clay lenses.

Precipitation and subsequent infiltration provide recharge to the groundwater flow system in the region. The main recharge areas for the aquifers in Calhoun County are located in the valleys. The ridges generally consist of sandstones, quartzite, and slate which are resistant to weathering, relatively unaffected by faulting, and therefore, relatively impermeable. The ridges have steep slopes and thin to no soil cover, which enhances runoff to the edges of the valleys (Planert and Pritchett, 1989).

The thrust fault zones typical of the county form large storage reservoirs for groundwater. Points of discharge occur as springs, effluent streams, and lakes. Coldwater Spring is the largest spring in the state of Alabama with a discharge of approximately 32 million gallons per day. This spring is the main source of water for the Anniston Water Department from which FTMC buys its water. The spring is located approximately 5 miles southwest of Anniston and discharges from the brecciated zone of the Jacksonville Fault (Warman and Causey, 1962).

Shallow groundwater on FTMC occurs principally in the residuum developed from Cambrian sedimentary and carbonate bedrock units of the Weisner Formation, Shady Dolomite and locally in lower Ordovician carbonates and shales. The shallow groundwater in this area generally flows to the northwest and discharges to streams in the area. The residuum may yield adequate groundwater for domestic and livestock needs but may go dry during prolonged dry weather. Groundwater within the residuum serves as a recharge reservoir for the underlying bedrock aquifers. Bedrock permeability is locally enhanced by fracture zones associated with thrust faults and by the development of solution (karst) features.

Two major aquifers were identified by Planert and Pritchett (1989), the Knox-Shady and Tuscumbia-Fort Payne Aquifers. The continuity of the aquifers has been disrupted by the complex geologic structure of the region, such that each major aquifer occurs repeatedly in different areas. The Knox-Shady Aquifer group occurs over most of Calhoun County and is the main source of groundwater in the county. It consists of the Cambrian and Ordovician aged quartzite and carbonates. The Conasauga Dolomite is the most utilized unit of the Knox-Shady Aquifer, with twice as many wells drilled as any other unit (Moser and DeJarnette, 1992).

The Tuscumbia-Fort Payne Aquifer occurs in the extreme northwestern portion of the county. This aquifer consists of Mississippian age carbonates and shales. Because of its limited outcrops in the recharge area, and the rugged terrain of the outcrop area, the Tuscumbia-Fort Payne Aquifer is not considered a major groundwater supply in Calhoun County (Moser and

DeJarnette, 1992). However, it is an important source of groundwater in counties to the west (Planert and Pritchett, 1989).

### **1.7 Local Hydrogeology**

Groundwater in the vicinity of the 11 CWM sites generally occurs within the residuum and the weathered zone of the undifferentiated Ordovician/Mississippian Athens and Floyd Shales. Based on data from temporary monitoring and permanent wells installed during previous SI activities at surrounding parcels, the depth to groundwater ranged from 8 to 32 feet bgs. The static water levels in these wells ranged from 0 to 22 feet above the depth at which groundwater was encountered.

The potentiometric surface shown in Figure 1-13 mimics the slope of the ground surface. Based on groundwater elevation data collected on April 22, 1999 from wells installed on surrounding parcels during the SI activities, groundwater flow in the vicinity of the CWM sites locally appears to be the northeast, with the exception of Parcel 509(7), Parcel 188(7), and Parcel 511(7). Groundwater flow at Parcels 188(7) and 509(7) appears to be to the northwest. Groundwater flow at Parcel 511(7) appears to be to the north with components of northeasterly flow off Sunset Hill on the western side of the site and northwesterly flow from Howitzer Hill on the eastern side of the site.

### **1.8 Scope of Work**

The scope of work for activities associated with the SI at the CWM sites, Parcels 509(7), 183(6), 511(7), 512(7), 513(7), 516(7), 182(7), 180(7), 514(7), 517(7), and 188(7), as specified by the statement of work (USACE, 1999b), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Develop the site-specific UXO safety plan.
- Conduct a surface and near-surface UXO surveys over all areas to be included in the supplemental sampling effort.
- Provide downhole UXO survey support for all intrusive drilling to determine buried downhole hazards.
- Collect 43 surface soil samples, 43 subsurface soil samples, 41 groundwater samples, 17 surface water samples, and 17 sediment samples to determine the

10/06/00 11:09:11  
DBILLING c:\cadd\design\796887.es.015  
STARTING DATE: 12/20/99 DATE LAST REV.: DRAWN BY: D. BILLINGSLEY  
DRAFT, CHK. BY: ENGR. CHK. BY: J. RAGSDALE  
INITIATOR: J. RAGSDALE DWG. NO.: 796887.es.015 PROJ. MGR.: J. YACOB

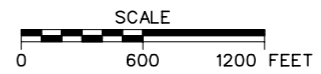


**LEGEND:**

- FTA-147-GP07 ⊕ GROUNDWATER MEASUREMENT POINTS
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (796.25) GROUNDWATER ELEVATION (FT MSL) (4/22/99)
- GROUNDWATER FLOW DIRECTION
- PARCEL BOUNDARY
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- SURFACE DRAINAGE / CREEK

**FIGURE 1-13**  
**LOCAL WATER LEVEL CONTOURS**  
**SITE INVESTIGATION AT**  
**CWM SITES**  
**PARCELS 509(7), 183(6), 511(7),**  
**512(7), 513(7), 516(7), 182(7), 180(7),**  
**514(7), 517(7) AND 188(7)**

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT MCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DCA21-96-D-0018



nature and extent of contamination present at the CWM sites, Parcels 509(7), 183(6), 511(7), 512(7), 513(7), 516(7), 182(7), 180(7), 514(7), 517(7), and 188(7) to provide data useful for supporting any future planned corrective measures and closure activities.

- Samples will be analyzed for the parameters listed in Section 4.6.
- Install additional monitoring wells and collect additional samples at potential sources of contamination identified during CWM engineering evaluation/cost analysis field programs.

Prior to IT conducting any field work at these sites, the USACE-Huntsville will clear the sites for CWM. Therefore, data related to CWM will not be collected as part of this SI. A CWM investigation will be provided in the CWM sites engineering evaluation/cost analysis that is being proposed by USACE-Huntsville (Parsons, 1999).

A USACE-Huntsville requirement for conducting work at the CWM sites at FTMC is to use UXO anomaly avoidance techniques; therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at the CWM sites. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance.

At completion of the field activities and sample analyses, draft and final SI summary reports will be prepared to evaluate the absence or presence of potential site-specific chemicals (PSSC) at this site, and to determine the nature and extent of any contamination detected in site samples, and to recommend further actions, if appropriate. SI sampling reports will be prepared in accordance with current U.S. Environmental Protection Agency (EPA) Region IV and ADEM guidelines.